Integrated Watershed/ Landscape Analysis An Ecosystem Approach

Integrated Watershed/Landscape Analysis An Ecosystem Approach

As agencies and other interests deal with ecosystem management issues such as T&E species impacts, riparian area degradation, and vegetation allocations, watersheds are increasingly being used as a basis for analysis. Ecosystem management case studies frequently use a watershed for defining boundaries, analyzing functional systems (e.g., channel processes related to riparian values or upland site erosion related to desired plant communities), and setting management objectives. The Environmental Protection Agency and other agencies have organized institutionally along the lines of watershed management to enable them to better address water quality, wetlands, and other legal requirements. This paper proposes that BLM incorporate a systematic process for analyzing watersheds into its ecosystem and vegetation management initiatives. The Bureau needs to develop methods for ranking multiple watersheds to guide more intensive management actions and to provide direction for further studies on the effects of land and water use on watershed processes.

Watershed processes may be viewed as biological and physical interrelationships that function systematically to produce healthy watershed conditions. Although using the term "healthy" may be somewhat subjective, it is generally understood that if watersheds are functioning properly, they exhibit good water quality, stable stream channels, productive sites for vegetation, good protection for soils, natural streamflow regimes, and other desirable qualities. A proper understanding of and ability to analyze watershed processes can bring about a more effective integration of Bureauwide initiatives, including those designed to manage public lands for desired plant communities or properly functioning riparian conditions.

Watershed analysis begins at a level where multiple watersheds are identified and evaluated. In concept, this level of analysis combines a number of key watershed processes and land (or water) resource values to determine a relative watershed condition and management category. Resource values are based on economic, legal, institutional, and social factors derived from regional planning efforts, including river basin plans, State wildlife plans, and State Director guidance. Watershed condition is then determined by comparing existing and desired ecological outputs, including both biological and physical products. At a minimum, the results from this analysis would place watersheds into unsatisfactory and satisfactory condition classes, while management categories would be based on the potential for improvement or susceptibility to degradation. An example of watershed analysis categories could look like the following:

Condition	Management Category
A. Satisfactory	High degree of protection
B. Satisfactory	Low degree of protection
C. Unsatisfactory	High responsiveness to treatment
D. Unsatisfactory	Low responsiveness to treatment

Watersheds in categories A and C would be given higher priority for intensive management, including funding support for data collection and activity-level analysis. With the

exception of State river basin planning for water allocations, or perhaps EPA's nonpoint source planning, this type of analysis has not been applied or demonstrated extensively by land management agencies.

Most of BLM's experience in watershed analysis has been in the area of in-depth planning within a particular watershed area, primarily for activity-level resource management. This level of analysis, being a step below the multiple watershed analysis, is directed towards high-priority watersheds. The Utah BLM staff, with assistance from the Service Center, recently completed a comprehensive watershed analysis for Sagers Wash, which is located in northeastern Utah. A landscape resource analysis approach was used to demonstrate results of a more intensive watershed analysis; graphic information from the Sagers Wash analysis is presented later in this handout.

Higher-level analysis of multiple watersheds is intended to be a "screening" tool that uses existing information, state-of-the-art analysis (i.e., computer models and GIS), and opportunities for cooperative partnerships. Our experience in Sagers Wash offers,in part, three findings that can be applied to larger-scale multiple watershed analyses:

1. GIS and soil, vegetation, landform, and hydrologic data can be efficiently used to delineate watersheds and determine process-based conditions.

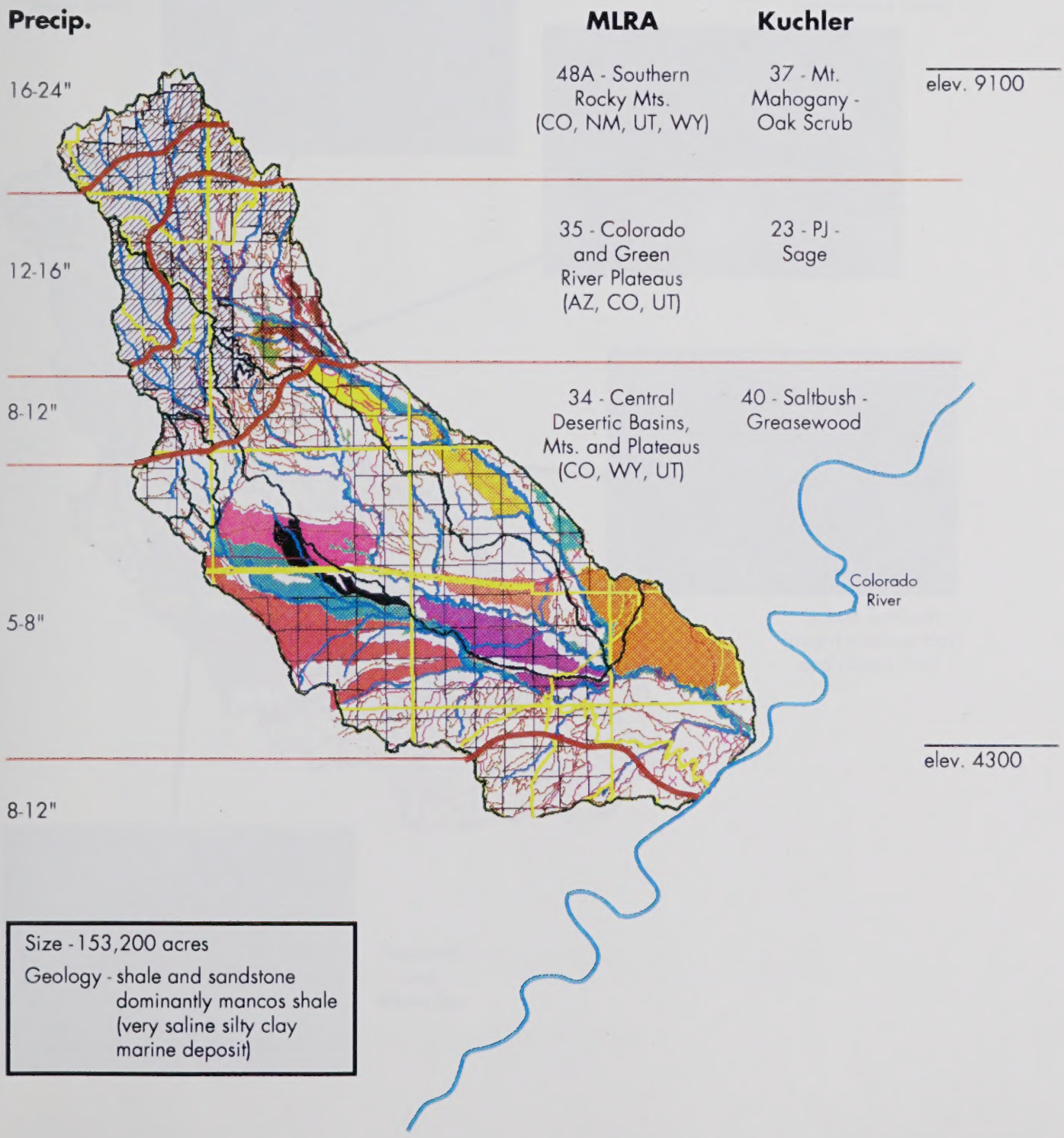
2. Effects that management actions have on basic watershed processes and values (i.e., water quality, channel stability, site productivity, and water yield) can be quantitatively predicted.

3. Watershed units provide a focal point for interdisciplinary and interagency participation because of the indisputable nature of watershed boundaries and a common interest in watershed values.

The paper titled Ecosystems Management in the BLM: A Process to Promote Biological Diversity and Sustainable Development, dated January 13, 1993, emphasizes the importance of thinking in terms of relationships, such as headwaters to downstream, above ground to below ground, and up slope to down slope. We suggest that watershed (landscape/resource) analysis is the appropriate means to understand relationships between landscapes, water sources, and biological factors. Watershed analysis is not a new concept; specific examples highlighting good results can be found in BLM and other land management agencies. The challenge will be to compile the success stories, develop an analytical process for multiple watersheds, demonstrate the process in conjunction with planning, and then implement a practical approach to watershed analysis throughout the Bureau.

Colorado River Drainage Basin — Sagers Wash Watershed

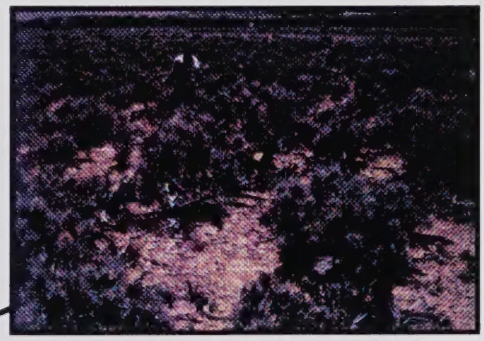
Sagers Wash Watershed
Setting and Ecoregion Relationships

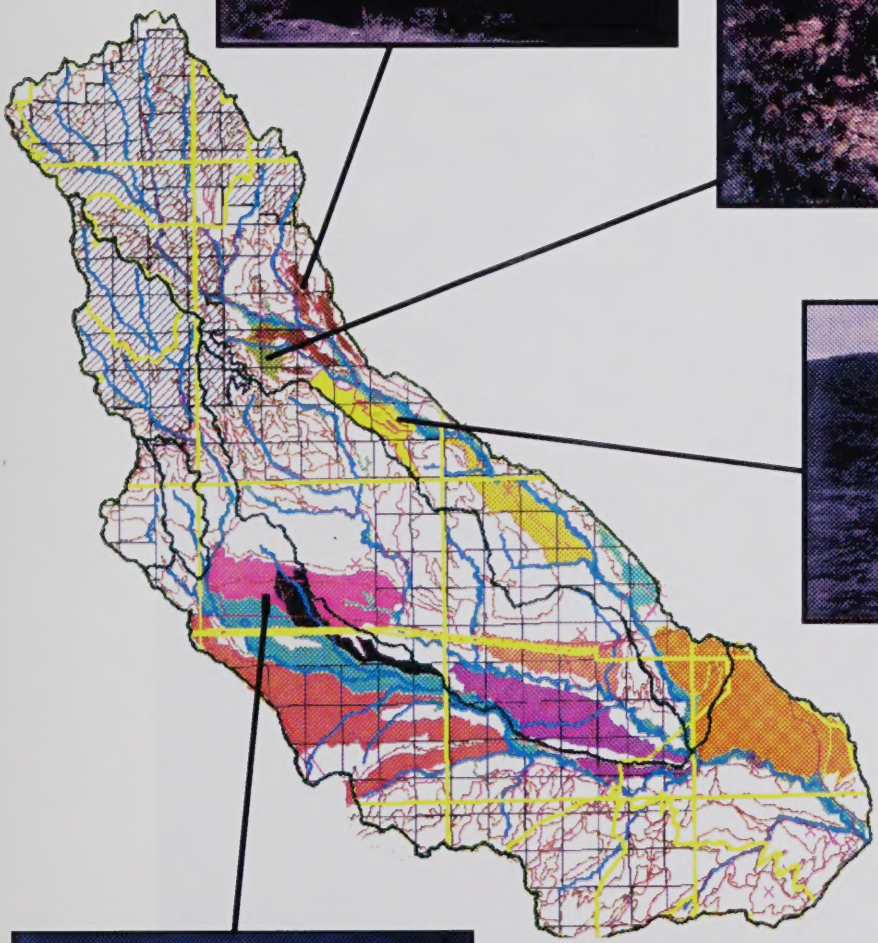


Ecosites
(based on soils, vegetation and setting)

Pinyon - Juniper
(semidesert
stony loam

Sagebrush
(semidesert loam)

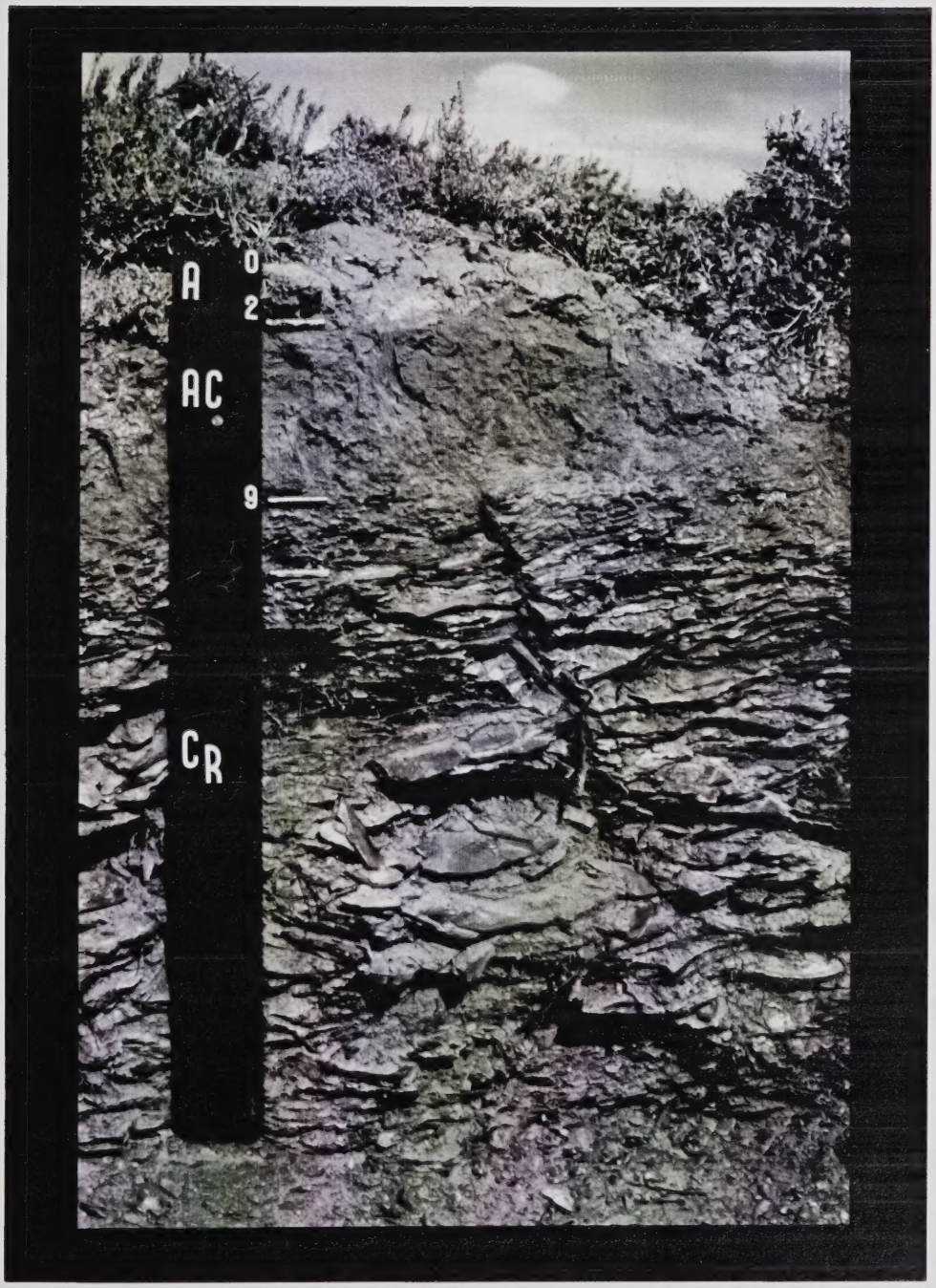




Nuttall Saltbush
(desert shallow clay
and desert clay)

Badlands
and
Alkali Fan

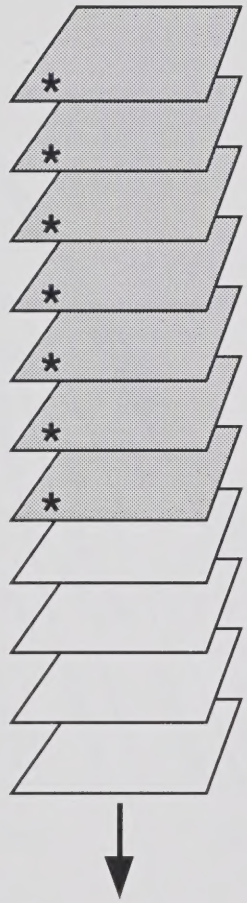
Soils: A Key Element in the Landscape Resource Analysis Approach



Chipeta Soil

Integrated Landscape/ Resource Analysis
(Sagers Wash Watershed Comprehensive Plan)

Climate (Precipitation)
Topography (DEMs)
Geology (Soil Parent Materials)
Soils (Physical & Chemical Properties)
Vegetation (Type, Cover, and T&E Plants)
Surface Hydrology
Land Use
Resource Condition (Soils & Range)
Archeological Sites
Existing Treatment & Structures
Research Information



Existing Condition Evaluations
- Soil Erosion Prediction
- Sediment Quantity & Quality
- Salt Transport

Management Opportunities
- Site & Practice Selection
- Practice Effectiveness Prediction

Cost-Benefit Evaluations

* Soil Survey Mapping, Modeling & Enhancement

The Lands We Manage
(The Resources & Their Use)